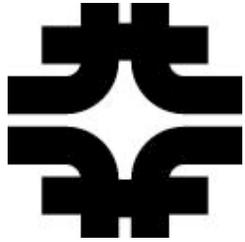


US T1 Requirements

D. Petravick

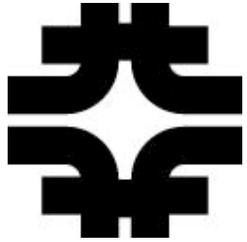
IGrid2005 Panel Meeting

UCSD; Sept 29, 2005



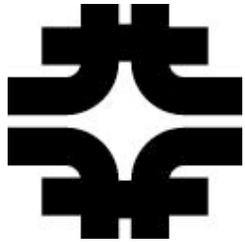
T[0-3] labels

- Derived from the MONARC model of Globally distributed computing.
- Experiments use the labels differently
 - Computing TDRS for the experiments differ.
- Hemispheric differences
 - In Europe
 - T1 centers typically serve several LHC experiments.
 - In the US --
 - T1 Centers serve one experiment.
 - Use the (unlabelled) US Open Science Grid infrastructure in addition to labeled T[0-3] centers.



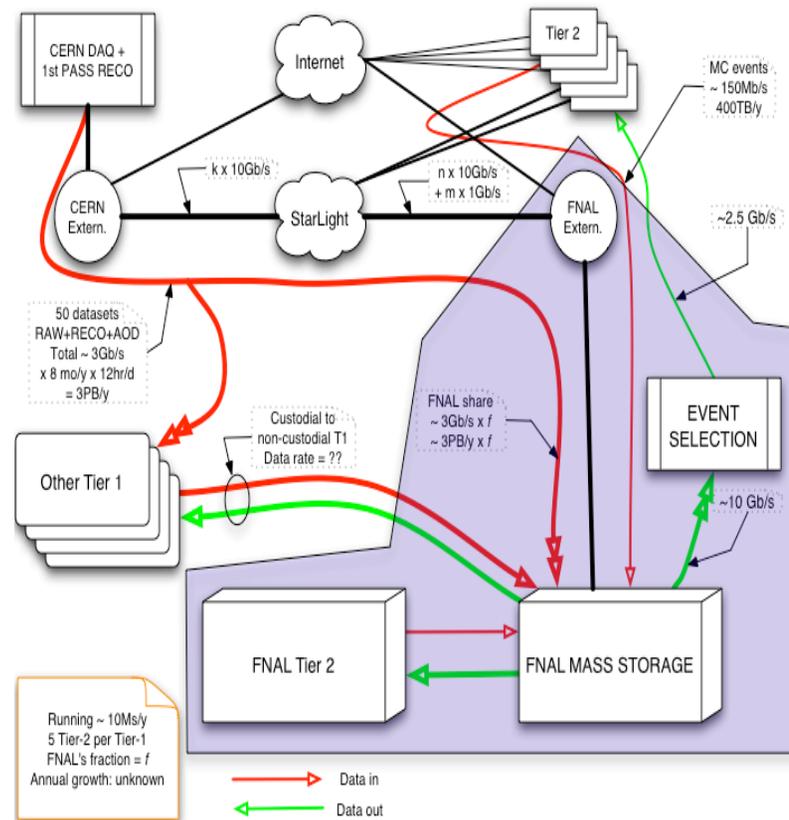
Evolution of LHC Computing

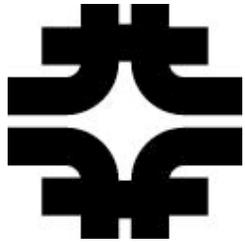
- LHC will provide a rich science program over many years.
- Present/Near Term
 - Experiments have TDR's + plans which specify the functionality in 2006/7.
 - Plans evolve.
- Future
 - Ongoing computing system R&D can inform the evolution of LHC computing.
 - Network research has a role in in this R&D.



CMS T1 Center

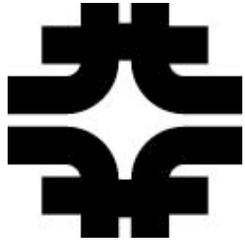
- Archive Distributed second copy
- Event selection for further analysis. -- selections exported work wide.
- Substantial analysis computing





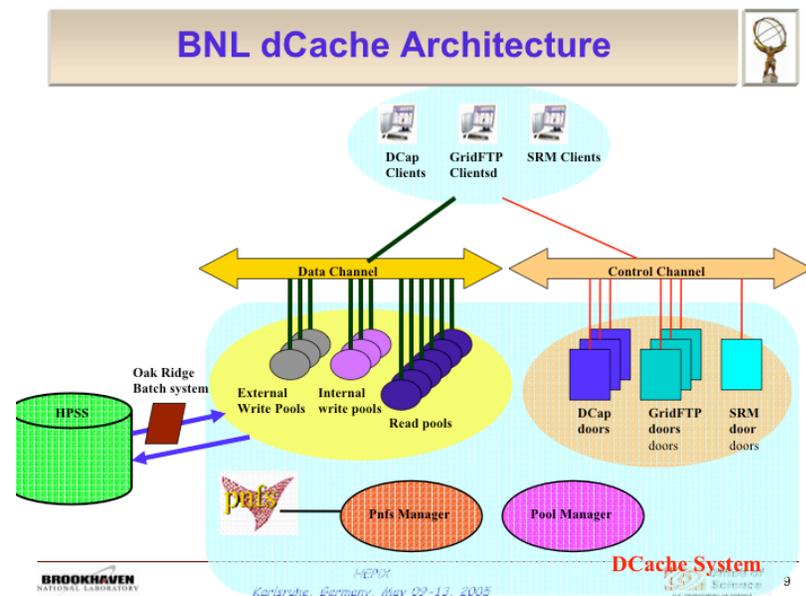
FNAL and CMS -- Planning.

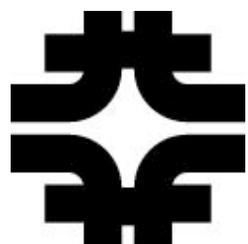
- FNAL will have T1 and an Analysis Facility.
 - Sizing guidance provides average rates and provisioning guidance of 2x smoothed rate.
- Average into FNAL
 - From T1, CERN Smoothed rate: 7 Gbps
 - Analysis center dataset ingest 1.5Gbit/sec
 - Analysis user data sets 0.5 Gb/sec
- Average out of FNAL
 - 3.5 Gbps (n.b. selected events)
 - Potential world-wide distribution for hosted data.



T1 equipment

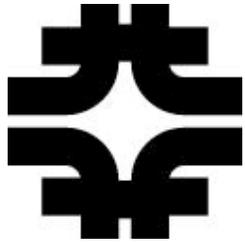
- Commodity, white box type storage nodes, connected on Local LAN.
- High rates by aggregation.
- dCache software at both BNL/FNAL





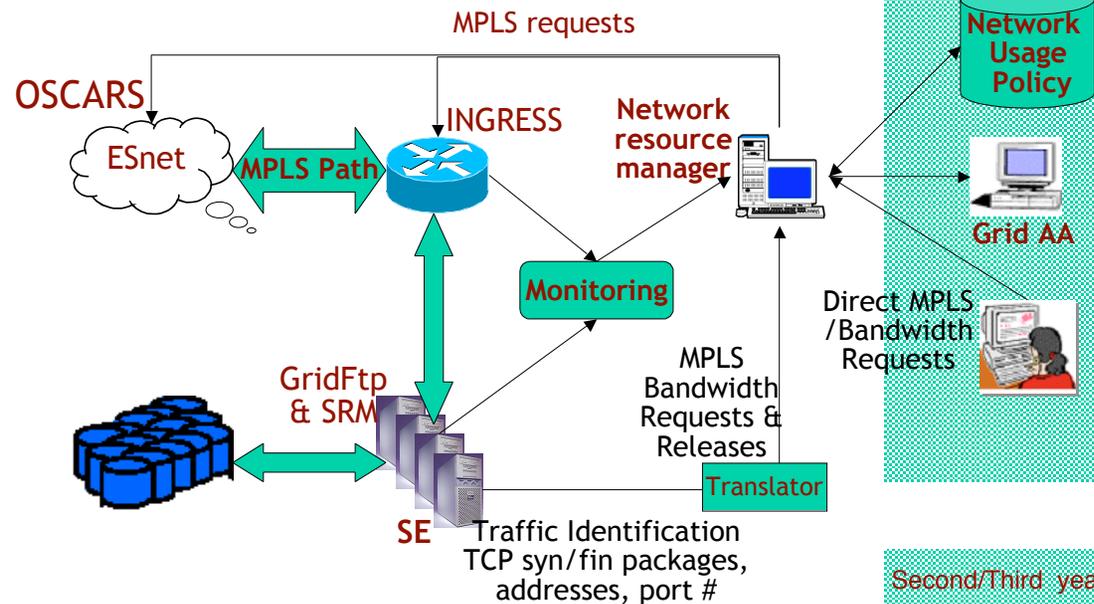
Leadership and Evolution

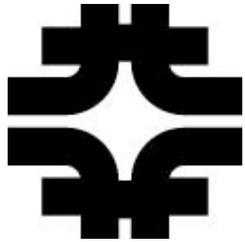
- T1 software engineers and technical managers actively contribute to Grid and Experiment middleware.
- System demonstrations supporting this evolution of the LHC data systems have additional, independent requirements at the T1 centers.
- These people are experienced in and look to RHIC, Run II, and LHC development for guidance on these requirements.



BNL Oscars

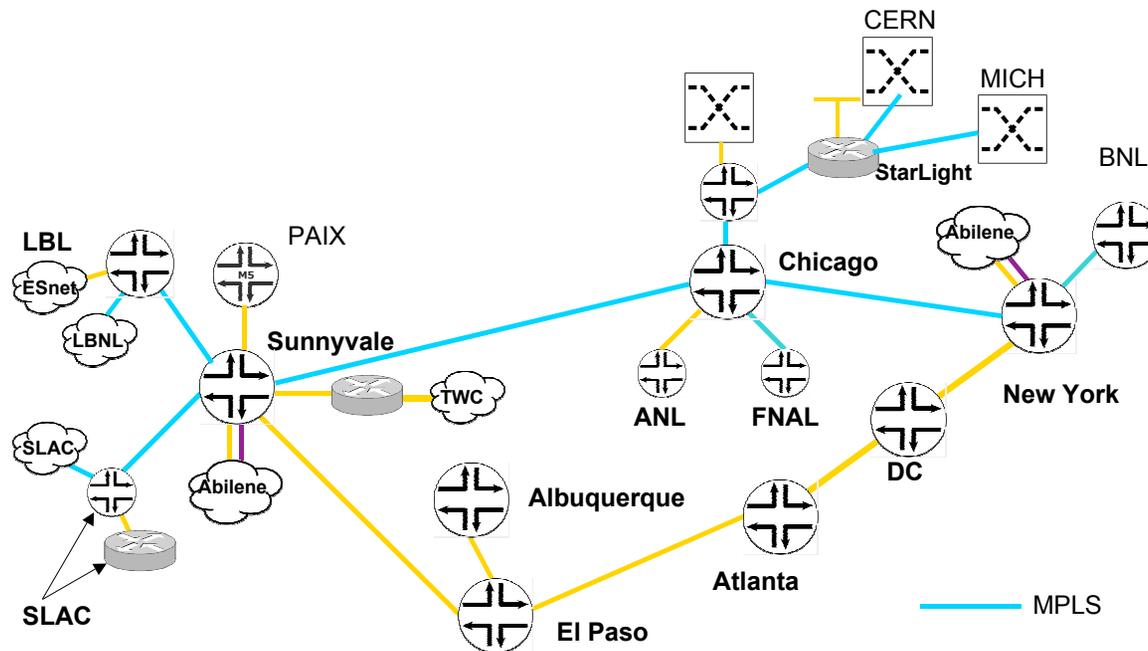
Proposed Prototype/Primitive Infrastructure

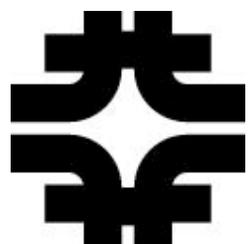




BNL MPLS paths

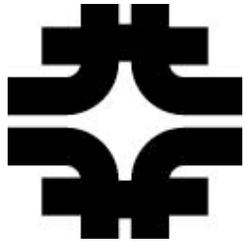
Establish MPLS paths with Initial Partners





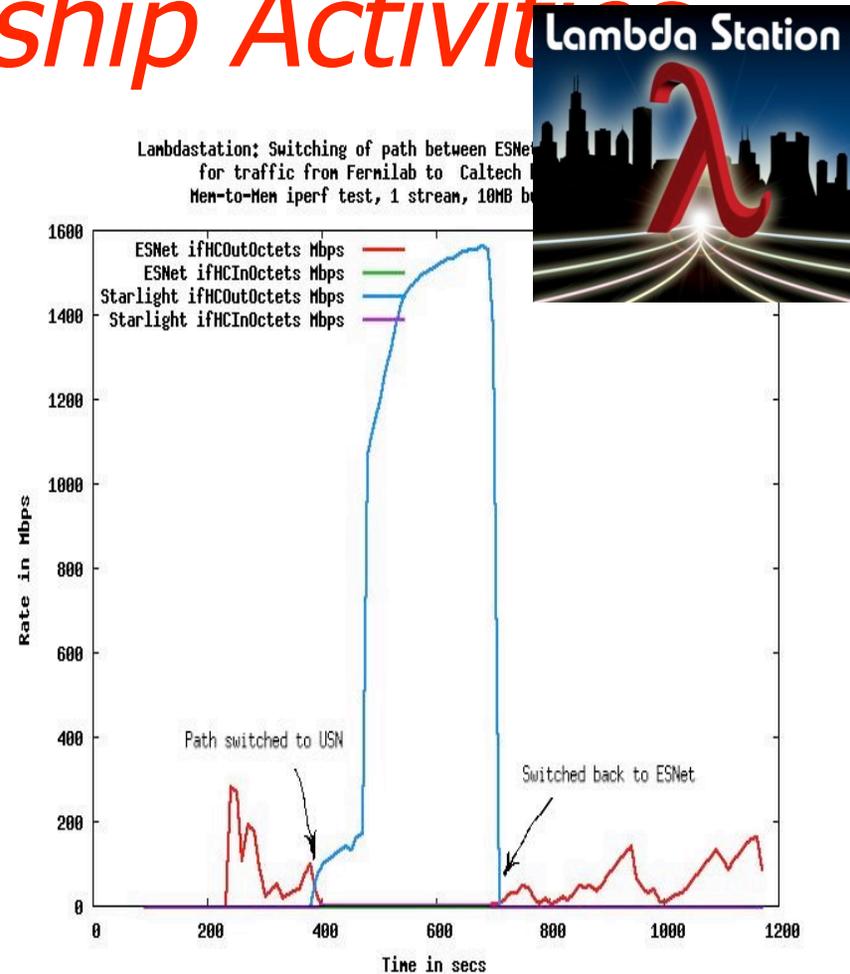
FNAL relationship with R&E networking

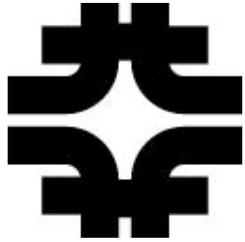
- Light-paths to
 - BNL (ESNet/OSCARS),
 - Caltech (USN, Ultralight),
 - McGill (CANET*4)
 - NCHC(TWAREN),
 - Prague (surfnet+cesnet),
 - UCL(UKLight),
 - Westgrid (CA*net4),
- Production networking
 - Most Places: ESNet
 - Recent Performance testing
 - CERN (US-LHCNET)
 - DESY(ESNet +GEANT + DFN)



FNAL Network Leadership Activities

- FNAL
 - Developing Lambdas Station infrastructure
 - Dynamically interface capacious FNAL LAN to light paths.
 - Interfaced:DOE USN, Caltech Ultralight.
 - Uses Research lambdas to Starlight facility
 - Collaborates on oscars/ terrapaths, ultralight





Summary

- Provisioning requirements must consider production plans and evolution/leadership.
- Plans
 - average sustained rates of order 10 Gbits/sec.
 - Additional capacity is an important contingency
 - 2X Provisioning guidance not universally accepted.
 - As turn-on comes nears, plans may be adjusted.
 - Adjustments seem to indicate increases.
- Evolution and leadership activities require additional provisioning.